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adox and the *crux* of optical science, viz., the rectilinear propagation of light, and the fact that light can and does shine around a corner. The starting-point of this discussion is a remarkable generalisation of Green's Theorem—itself the most powerful theorem in mathematical physics—to include four independent variables, time being the one added to the usual three space-coordinates.

Geometrical optics is the subject of the third hundred pages, a very elegant chapter.

The remainder of the book goes to dispersion and polarisation, treated in terms of the electromagnetic theory. Much of the subject matter is the result of Helmholtz's own investigations concerning the mysterious connexion between ether and matter.

The appearance of these six posthumous volumes of mathematical physics, in addition to three volumes of *Scientific Papers* and two epoch-making treatises, cannot be contemplated without amazement at the changes which the genius of this one man has wrought on the face of modern science.

The ease with which he lays aside his seven-leagued boots and adapts himself to the intellectual wants of his hearers makes him a brilliant example to all teachers. While as an instructor in the elementary parts of his subject he was never a striking success, to investigators the mere mention of his name is an inspiration.

Henry Crew.

Ostwald's Klassiker der exakten Wissenschaften. Vier Abhandlungen über die Elektricität und den Magnetismus (No. 13.) Von *A. Coulomb.* Pages, 88. Price, M. 1.80. Zwei Abhandlungen über die Wärme. (No. 40.) Von *Lavoisier* und *Laplace.* Pages, 74. Price, M. 1.20. Anmerkungen und Zusätze zur Entwerfung der Land- und Himmelscharten. (No. 54.) Von *J. H. Lambert.* Pages, 95. Price, M. 1.60. Ueber Kartenprojection. (No. 55.) Von *Lagrange* und *Gauss.* Pages, 101. Price, M. 1.60. Leipsic: W. Engelmann.

The four essays of Coulomb here reprinted are the most important of his seven fundamental memoirs on the laws of electricity and magnetism. The first two are devoted to the proof that the repulsions and attractions of electrified and magnetised bodies take place according to the law of the inverse squares, the third deals with the loss of electricity in such action, the fourth proves that the electric charge is distributed over bodies by its own repulsion, and that when in equilibrium it is always at the surface. The results form the basis of the entire mathematical treatment of magnetic and electrostatic phenomena as it has taken shape in the modern theory of potential, and until the researches of Faraday formed the sole basis. Revolution after revolution has taken place since then in electrical *theory*, but the *facts* established by Coulomb remain unchanged, and his investigations, therefore may be regarded as an exemplar of scientific procedure.

The memoirs of Lavoisier and Laplace are extremely important as marking the starting-point of the investigations which led up to the thermal theories of J.R. Mayer, Krönig, Clausius, and others, and in view of the frequent references to them in books on the history of the conservation of energy, it is well that they can be obtained in a separate and cheap form.

Lambert's researches are the first general investigations on cartography and form collaterally valuable contributions to pure mathematics. The thread of investigation in this field was continued by Lagrange, who, while still generalising the methods of treatment, aimed, as was always his wont, at obtaining practically useful results. With Gauss, emphasis was principally laid upon the abstract mathematical point of view.

The publication of this series is a valuable work, and all students should possess the Classics which relate to their departments. μ.

ELEMENTS OF THEORETICAL PHYSICS. By *Dr. C. Christiansen*, Professor of Physics in the University of Copenhagen. Translated into English by *W. F. Magie, Ph. D.*, Professor of Physics in Princeton University. London and New York: The Macmillan Co. 1897. Pages, 339. Price, $3.25.

Of the flood of recent text-books on physics the treatise of Professor Christiansen has stood high in pedagogical favor. It exists at least in a German translation and has now been Englished by Prof. W. F. Magie of Princeton University. The book is not an elementary one, and requires considerable knowledge of mathematics, but it is condensed and treats the main problems of theoretical physics in a concise and direct manner. There are fourteen chapters in all, entitled as follows: "General Theory of Motion," "The Theory of Elasticity," "Equilibrium of Fluids," "Motion of Fluids," "Internal Friction," "Capillarity," "Electrostatics," "Magnetism," "Electro-Magnetism," "Induction," "Electrical Oscillations," "Refraction of Light in Isotropic and Transparent Bodies," "Thermodynamics," and "Conduction of Heat." American text-books of physics, having a different purpose in view, devote the greater part of their space to the discussion of methods and instruments, so that a treatise like Christiansen's which is almost totally abstract and mathematical will find the field virtually unoccupied. The translation is good, and the publishers are to be congratulated upon the excellent mechanical makeup of the book. μκρκ.

UEBER DEN URSTOFF UND SEINE ENERGIE. I. Theil. Eine physikalish-chemische Untersuchung über die theoretische Bedeutung der Gesetze von Dulong-Petit und Kopp auf der Grundlage einer kinetischen Theorie des festen Aggregatzustandes. Von *Dr. Phil. H. Keller*. Leipsic: B. G. Teubner. 1896. Pages, 58. Price, M. 2.

The problem of the *prima materia* has occupied philosophical brains for more than two thousand years, and after having been laid to rest by modern philosophical criticism as the vision of a metaphysical dream, has now again come to the fore